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A server for the ATLAS time machine

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The Argonne Tandem Linear Accelerating System (ATLAS) facility at Argonne National Laboratory is a National User Facility capable of delivering ion beams from hydrogen to uranium. The existing tune archiving system, which utilizes Corel's Paradox relational database management software, is responsible for retrieving and restoring machine parameters from previously optimized configurations. However, the Paradox platform suffers from outdated support, a proprietary programming language, and limited functionality, prompting the need for a modern replacement.

The new system is composed of a modular architecture featuring a separate user interface, a time-series storage database, and a backend that connects the two. The new backend employs the FastAPI framework with WebSockets for asynchronous communication, and integrates Pydantic and SQLAlchemy ORM to enable a type-safe, object-oriented interface with SQL databases. This upgraded system significantly improves upon the legacy Paradox-based solution by offering a more robust, open-source architecture with enhanced reliability, maintainability, and ease of use.

Keywords: Starlette, WebSockets, SQLAlchemy ORM, Asyncio

Footnotes

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Author: TORRES, Matthew (Argonne Tandem Linac Accelerator System)

Co-authors: RAMASWAMY, Ananth (University of Illinois Urbana-Champaign); BLOMBERG, Ben (Argonne National Laboratory); DICKERSON, Clayton (Argonne National Laboratory); STANTON, Daniel (Argonne National Laboratory); NOVAK, David (Argonne National Laboratory); DUNN, Gavin (Argonne National Laboratory); BUNNELL, Kenneth (Argonne National Laboratory)

Presenter: TORRES, Matthew (Argonne Tandem Linac Accelerator System)

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